Exercise 292

For the following exercises, use the change-of-base formula and either base 10 or base e to evaluate the given expressions. Answer in exact form and in approximate form, rounding to four decimal places.

$$\log_5 47$$

Solution

In order to evaluate this expression, set it equal to an unknown variable x.

$$\log_5 47 = x$$

The base is 5, the exponent is x, and the result is 47.

$$5^x = 47$$

To solve for x, take the logarithm of both sides (ln or log—it doesn't matter).

$$\ln 5^x = \ln 47$$

Use the property of logarithms that brings the exponent down in front.

$$x \ln 5 = \ln 47$$

Divide both sides by $\ln 5$ to solve for x.

$$x = \frac{\ln 47}{\ln 5} \approx 2.3922$$